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JOURNEY ALONG THE WEST COAST OF SOUTH AMERICA, FROM PANAMA TO VALPARAISO.

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It was in midwinter that I left the St. Lawrence, then bound in ice, for the tropics. Within a fortnight I had passed from Quebec and its citadel, wreathed in snowdrifts, to Panama and its old ramparts, decaying under a shroud of rank vegetation. In the passage I had crossed the track of Columbus' first memorable voyage to America ; had enjoyed ravishing glimpses of those three brightest jewels in the coronet of the Antilles, Cuba, St. Domingo and Jamaica ; had revelled in the fruit markets of Kingston ; been tossed by the trade winds on the Caribbean ; enjoyed a stroll along the coral-strewn beach of the Isthmus, and been whirled by steam through its luxuriant forest to the Pacific—such marvellously rapid transformations in the surroundings of life does steam make possible !

On approaching Aspinwall from the Caribbean, there rises on the horizon a low line of dense brushwood, which invades the very sea, leaving only here and there a narrow strip of beach, white with the disintegrated remains of coral reefs. Looking northward, this low coastline stretches past the mouth of the Chagres River till it merges into the watery horizon ; southward it terminates in the bold promontory of Porto Bello. Ahead opens out Navy Bay, the old Bahia de Naas, at the foot of which, on the Island of Manzanilla, stands Aspinwall, the sad and dingy realization of so many bright dreams of colonization. In Porto Bello and Aspinwall we have typical examples of old and new ports of transit. In Porto Bello Columbus cast anchor in 1502. As soon as a Pacific trade sprang up an Atlantic port of shipment became necessary, and Porto Bello, being the best harbor on the coast, was selected as the site of a commercial mart in the reign of Philip II. Thither for nearly two

centuries the galleons of old Spain carried the merchandize of Europe, to be exchanged for the rich products of the Pacific. On the news of the arrival of the fleet reaching Panama, the merchants of the West Coast, who were awaiting it, flocked to Porto Bello. During the forty days that the fair lasted, Porto Bello was the most active, licentious and pestilential spot in the new world. At length the fleet sailed, and the merchants hurried away with their freight, some carrying it to Panama over the good high road that crossed the Isthmus, others transporting it by sea to the mouth of the Chagres, and by that rapid river to Cruces, from which a well-paved road of less than twenty miles lead over the backbone of the Isthmus to Panama. Porto Bello remains, in the empty substantial stone buildings which old Spain erected to accommodate her commerce. Chagres and Cruces are no more. Aspinwall sprang up in a day, and overshadowed them with her flimsy wooden barracks, and vies with them in immorality and filth. But the town has no commercial importance ; nothing is bought or sold in it. Fleets of steamships arrive and discharge their cargoes directly into the cars of the Panama Railroad and depart. Steam handles everything, and therefore almost the only occupation of the people is to cater to the vices of the crews. The visitor cannot but feel how vain were poor Paterson's hopes. It was not far from Navy Bay that the adventurers of the Darien expedition landed in 1698, and laid themselves down to die within a twelvemonth, instead of founding a colony which should stretch from the Atlantic to the Pacific, and monopolize the trade of two worlds—a colony in which religious equality and free trade were to be the fundamental principles of social and commercial life. Colon is less unhealthy than it was; the mere clearance of some of the surrounding brushwood, and the filling up, though only with decaying rubbish, of some swampy ground, having notably improved its sanitary condition. Paterson's commercial metropolis might therefore have stood the ravages of climate, but it could not have survived the deflection of trade from the Isthmus which gradually took place during the 18th century. By 1748, however, the products of the coast were carried to Europe so exclusively by sea, without transhipment, that the fleet of galleons ceased to make its annual voyage to Porto Bello, and

Panama and that Atlantic Port lost their commercial importance, never to regain it.

For a century the Isthmus was deserted, but in 1849 the gold discoveries in California attracted to the west coast of North America most of the worthless population of the East. Week after week there were then discharged at the mouth of the Chagres River ship-loads of the most reckless spirits of both continents. These forced their way towards the land of gold and lawlessness over this disused avenue of ancient commerce, many of them impelled by a love of riot and rapine as fierce as that which carried the buccaneers who followed Morgan up the same stream to the sack of Panama.

To accommodate the California trade, the Panama Railroad was commenced in 1850, and completed in 1855 ; and thenceforward the traveler to the Pacific has crossed from sea to sea in fewer hours than it formerly took days, and has enjoyed the luxury of tropical scenery without undergoing the usual discomforts of tropical travel. And a glorious sight it is, this wealth of vegetation which covers the Isthmus. The train moves through a trench cut out of a dense forest. Conspicuous amongst the trees are palms of so many varieties that the mind marvels at the resources of nature which can modify so profusely a typical form without losing the clue ; to relieve the deeper color of the palm, the banana shoots forth its clusters of vividly green leaves, and the canes rear their tufted stems in graceful groups to a height of 50 feet and more, while high above all the cotton trees rise like faultless columns crowned with a capital of branches. These ancient denizens of the forest are festooned, trunk and branch, with creepers and rare orchids, which still cling to and beautify their leafless limbs after they have sapped all life from them. It was from the top of one of these towers of observation, on the summit of the low ridge of 265 feet to which the Rocky Mountains and Andes have here sunk, that Drake first saw the Pacific in 1572, "and besought Almighty God of His goodness to give him life and leave to sail once an English ship upon that sea."

But like all luscious things, tropical vegetation, where as luxuriant as on the Isthmus, soon palls upon the senses, and the eye seeks longingly among the rounded masses of brilliant color for points and angles, and bare stems, and the beautiful intricacies of branch

and branchlet, and twigs, and for the neutral tints of stocks and stones ; but it seeks in vain :—and we decide that our northern landscape and our northern climate are healthier for the mind and for the body. Nevertheless, the railroad drive across the Isthmus must remain a bright spot in the memory of every one who has taken it, even if he has been familiar with the tropics elsewhere ; and it is to be wondered at that all of those who go to California for pleasure do not select this route, so full of beauty and historical interest, in preference to the overland, in either going or returning.

The story of the Isthmian Railroad has been often told, and I shall not repeat it.

It lands its passengers outside the town of Panama, and as the Californian steamer is usually lying in the bay with steam up, those bound north are carried away at once by the tender, and denied the privilege of spending a dollar in the town. Those of us whose destination lay southward, had to wait for the arrival in Aspinwall of the West India Company's boat with the English mails.

Panama has a history, but like many another place famous in the past as a commercial centre, it is yielding its importance to other cities, better situated to meet the requirements of modern trade. Its site was seized upon by the earliest Spanish adventurers on the Pacific as a most eligible centre from which to explore the West Coast. Its foundation, therefore, dates back to 1519. At once the little colony became the scene of active preparation for both peaceful and hostile expeditions. Only five years after its foundation, Pizarro sailed out of it on his first daring voyage to the land of the Incas. It prospered so rapidly that a century later it contained 12,000 dwellings and 8 monasteries, and was reputed to be such a treasure house that it tempted Morgan and his company of buccaneers to cross the Isthmus and undertake its capture. How much they suffered in the attempt, how wonderfully they succeeded, and yet how woefully they were disappointed in their expectations, is one of the stock stories of the Spanish Main. As one stands on the ramparts of the present town, there can be seen rising above the trees, some miles distant to the eastward, a solitary tower. It is all that remains of the town Morgan sacked. When he and his dissolute crew had retired to quarrel over their scanty spoils, it was determined to build a town which would be proof against any other such assault, and for its site a point of land to the west jutting

boldly out into the bay, was chosen. To protect the town landwards, a deep trench was dug, and seaward, on three sides, strong walls were built upon the steep though not high rock. Jesuit, Dominican, Franciscan, took up their abode in the new town, and as usual occupied not a little of the narrow peninsula with churches, monasteries and colleges, whose remains still exist and testify to the wealth, ambition and artistic tastes of their builders.

Panama continued to prosper till towards the middle of the last century, when the trade of her colonies with old Spain had become so large as to necessitate other outlets than the Isthmus, and, the passage of Cape Horn having lost its terrors, commerce was deflected from Panama by the Cape to the old world. A temporary revival was brought about by the hosts of Californian immigrants who, before the railroad was built, were detained for days in the town. But the opening of the railroad, and correspondence between the Atlantic and the Pacific branches of the Pacific Mail Company's line, robbed the Isthmus of all benefit from the passenger traffic. At length the death-blow was given to Panama by two causes, working almost contemporaneously—one, the building and opening of the Central and Union Pacific Railroad, which withdrew from Panama much of the trade of China and Japan, and the Californian traffic; the other, the establishment by the British Pacific Steam Navigation Company of a line of steamers running direct from the South American ports on the West Coast to Liverpool. Prior to that time, the Pacific Steam Navigation Company, which does most of the trade of the West Coast, had gathered all its freight at Panama, transported it across the Isthmus by the Panama Railroad, and handed it over to the different lines of European steamers to be carried to England, France and Germany. But owing to a disagreement with the Panama Railroad about freights, they determined to try the experiment of a line of steamers from Callao and Valparaiso to England direct. The experiment succeeded, and thenceforward most of the transit trade, which they formerly brought to Panama, has been diverted. It was just a century previous that improvements in navigation opened direct trade with Europe by Cape Horn, to the detriment of the Isthmus.

Panama is a ruin. The fosse is now hardly recognizable as artificial, so filled is it with trees and creepers, and the old walls are falling in picturesque heaps into the sea. One portion of the fortification is kept in tolerable repair, for the bomb-proofs beneath the

ramparts are used as prisons, which the Government finds it necessary to keep sound, whatever else may fall to ruin. This bastion is the evening promenade of the Panamenos, and few cities in the Old World can boast of a view more full of human interest and beautiful scenes than this. In the evening the cool sea breeze sets inland with the sunset, the blazing heat of the day at once falls to a delicious temperature, and the fierce light of the midday sun no longer dazzles the eye. The varying distance of the numberless islands which stud the bay gives a distinctive beauty to each group. The Pearl Islands look like banks of gilded cloud in the far distance, just resting on the horizon. Other islands, such as Perico and Flaminco, near at hand, float on the placid water like rafts of verdure. Landward, we look across the shallow bay which separates the rampart from the town, and watch the waning light flitting from the crumbling fortification to the finely proportioned towers of the ruined Dominican convent, and the gables and walls of the Franciscan, and the façade of the old cathedral, all of which rise high above the crumbling buildings of the new town; till the city is lost in darkness and the shadows of the night creep up the sides of the hill Ancon that forms so appropriate a background. It is disenchanted to return homeward between the rows of drinking booths which line the streets, and meet the night patrol of truculent soldiers, accompanied by a band blowing discordant sounds.

Panama is not a pleasant place of residence. Though by no means so unhealthy as supposed, it is long before a European becomes reconciled to the climate. One can bear patiently a temperature of 80° for a day, or even for two or three, when certain that it will not last, and that in six months one will be cool enough; but a feeling of despair creeps over you as day follows day, and the same horrible heat continues, and you come to experience—what no telling can ever make you feel the full meaning of—that summer and winter are of the same temperature in the neighborhood of the equator, and that it will never be cool.

Another drawback to living in Panama is the intense heat of the political atmosphere; for Panama is almost constantly in a state of revolution, and it is not by any manner of means pleasant to live in a bomb-shell with the fuse lighted. The population of the Isthmus has become almost exclusively black. Formerly, of course, the influential ingredient was Spanish, but gradually the West Indies have transferred to the Isthmus more and more of their negroes

In politics they are without exception liberal, radically so. In 1861 the liberals came to the surface, and the blacks therefore came into power. Their treatment of the religious communities was so extremely objectionable that the clergy left in a body, and for a time none of the rites of religion were performed in Panama, and the city lay under the ban of the church. Strange to say, the blacks of the Isthmus (and this is very much the case elsewhere) do not seem to have been deeply influenced by the Roman Catholic religion, although its ritual might have been supposed to attract them. It may be that it does not give sufficient scope to the individuality of the negro, or it may be that, Roman Catholicism and revolution not being compatible, and the inhabitants of the Isthmus having always the choice, invariably prefer revolution to religion.

After several days' delay the arrival of the English mail was announced, and we embarked on the tender of the Pacific Steam Navigation Company, which transferred us to the S. S. *Chile*. The shores of the bay are so shallow that a long pier reaches water only of sufficient depth to float boats of light draft. A double handling of freight is thus incurred.

As already remarked, the Pacific Steam Navigation Company almost monopolizes the freight and passenger traffic of the West Coast of South America. It has three systems of boats ; first, a large fleet of very small side-wheelers, which run to every inlet and roadstead. These collect the freight and congregate it at certain centres, where a second class of boats, most of them also with paddles, of somewhat larger calibre, picks it up and discharges it at Callao, Arica, Iquique, Valparaiso or Concepcion. These are commodious ports, into which the large European screw steamers can enter, and where they can load. By this intricate system they manage to control effectively the whole trade of the coast. A Chilian line of steamers was during my stay on the Coast run in opposition, from Valparaiso to Arica. It has since been absorbed by the P. S. N. Co., but a more formidable rival has sprung up in a line of large boats trading between Germany and the Coast. Without the freight fed to the main line by smaller vessels, no line of steamers stopping merely at the larger ports on the coast, can, however, derive full benefit from the trade.

The following extract from the Time-Table of the Main Line from Panama to Valparaiso enumerates the ports of call of the second class boats in 1871 :

*Journey along the West Coast of South America.**Itinerary of the Mail Line of Pacific Steam Navigation Company Boats from Panama to Valparaiso.*

Port of Call.	Date.	Lat.	Remarks.
Leave Panama,	Jan'y 1st,	8.0 N.	New Granada.
Arrive at Guayaquil,	" 4th,	2.10 S.	Principal port of Ecuador.
" Payta,	" 5th,	5.03 S.	In Peru, within the desert zone. Terminus of the
"	" 7th,	"	Pura R. R.
" Callao,	" 9th,	12.02 S.	Port of Lima & Pacific terminus of Aroya R. R.
Leave Callao,	" 10th,	13.50 S.	All these hamlets on this arid coast are upon open
Arrive at Tambo de Mora,	"	"	roadsteads, where are shipped the fruits, wines,
" Pisco,	"	"	and products of the river valleys of the interior.
" Lomas,	" 11th,	"	
" Chala,	"	"	
" Atico,	"	"	
" Quilca,	" 12th,	16.50 S.	Formerly the port of Arequipa.
" Islay,	" 12th,	16.06 S.	Pacific terminus of Arequipa R. R.
" Molendo,	" 12th,	17.28 S.	Pacific terminus of Ilo and Moqueua R. R.
" Ilo,	" 12th,	18.23 S.	Pacific terminus of Tacna R. R. Though in Peru, it
"	" 13th,	"	is the principal port of shipment for Bolivia.
" Arica,	"	"	
" Pisagua,	" 14th,	"	Exports nitre only.
" Mejillones,	" 14th,	"	
" Iquique,	" 14th,	20.10 S.	A short R. R. ascends to the nitre beds on the Pam-
"	"	"	pas above and behind this portion of the coast.
" Toocpilla,	" 15th,	22.00 S.	In Bolivia ; first copper furnaces.
" Cobija,	" 15th,	22.28 S.	Principal port of Bolivia.
Leave Cobija,	" 15th,	"	
Arrive at Mejillones, de Bolivia,	" ..	23.2 S.	The Nitre beds extend southward on the Pampas
"	"	"	through the territory in dispute between Chile and
" Antofogasta,	" ..	"	Bolivia into Chile proper. Guano occurs on the
" Pan de Azucar,	" ..	"	headlands.
"	"	"	R. R. to the silver mines of Caracoles.
" Chanaral,	" 16th,	26.21 S.	Copper furnaces and mines on the coast and in the in-
" Caldera,	" 16th,	27.5 S.	terior.
" Carrizal Bajo,	" 17th,	28.05 S.	Terminus of R. R. from Salido copper mines.
"	"	"	Terminus of Copiapo R. R. ; scant vegetation.
" Huasco,	" 17th,	28.27 S.	Terminus of Carrizal, Alto and Carro Blanco Mine-
" Coquimbo,	" 18th,	29.37 S.	ral R. R.
" Valparaiso,	" 19th,	33.66 S.	At the mouth of the Huasco River, the first Chilean
"	"	"	Copper Smelting ; terminus of Coquimbo R. R.

Our course lay S. S. W. across the Bay of Panama, towards the most westerly headland of Ecuador, for there are few ports of consequence in New Granada, and what little merchandize was then gathered from such as exist, was carried by the small boats to Panama. Once out at sea, it became so cool that cloth clothes were necessary during the day and a great-coat was not amiss when the sun had set. After two days' steaming we dimly sighted Cape San Francisco, and the next day rounded Cape Santa Elena, a bold bluff running squarely out of a low sandy spit, and entered the Gulf of Guayaquil. Upon rounding the island of Puna, we found ourselves between the low, heavily wooded shores of the Guayaquil River. The island of Puna rises like a cone so uniformly from a level sandy beach, that after sailing round it you cannot be sure you have looked at it from opposite sides. On it Pizarro organized his little band, and along the sandy beach on which we saw the sun beating with a terrible glare, he and his armor-clad men plodded before crossing over to Tumbez, situated on a projecting promontory of the mainland, to the south, whence he marched into the interior.

It was evening when we entered the river, and before daylight we cast anchor opposite the town of Guayaquil. Immediately the steamer was surrounded by a fleet of canoes and rafts (*balsas*), from which streamed crowds of men and women, noisily loading our decks from stem to stern with fruits for the Lima markets—and such fruits ! The very quarter-deck was piled with oranges, plantains, pomegranates and cactus fruit, and from every bar and beam hung bananas of half a dozen different varieties. Besides these well known fruits, were *paltas*, or alligator-pears, and *mangos*, both *morado* (purple), and *amarillo* (yellow), more tempting to the eye than is the peach, but less savory to the tongue ; and the flavorless and watery *nisperos*, with its rough brown skin, as inviting as a russet, but not as true to its appearance; and the *memeyo*, only a little less flavorless than the *nisperos*. But more abundant than these was the favorite fruit, the *guava* (or *pacay*), a large black bean of mawkish sweetness, covered with a slimy down, and enveloped in a pod 2 feet long. Tropical fruit is beautiful to look at, but if we except the pineapple, incomparably inferior in flavor to that of the temperate zone. Even the famous *chirimoyo*, or custard apple, though more luscious, is to northern taste less delicious than a strawberry or a peach.

When each group of Indians had embarked their own consign-

ment, one or more men and women settled themselves on the deck, beside each pile, to accompany their goods to Lima. But in addition to their fruits, most had with them monkeys, parrots, paroquets, and a few even beautiful specimens of the puma, or South American tiger, which their owners fondled as we would a cat. Our decks, therefore, assumed an aspect very unlike what we are accustomed to on an ocean steamer.

Guayaquil looked most attractive from the boat. Up and down the river the bank was lined with canoes and rafts, laden with the products of the upper country, each raft carrying a picturesque thatched hut, the home of the boat-man. Along the shore stretched a long row of three-storied wooden houses, the second story protruding, and supported by a colonnade, so as to make a covered arcade over the footpath. The street terminates at the hillock of Santa Anna, from which springs a semicircle of low hills, that rise behind and above the town with graceful broken outlines. But all the attraction is confined to the river frontage. The streets elsewhere are a maze of channels of mud more or less liquid, according to the season; through which you pick your way along a narrow ridge of stones, which sometimes follows the middle, sometimes one or other side of the thoroughfare ; and if you are tempted by the banana leaves and cocoa palms overhanging the reed fences, to seek refuge from the smell by entering an enclosure, you find pigs and children wallowing together there, in a filth through which there are no stepping-stones. The characteristic building material of Guayaquil is the bamboo, which grows too many inches in thickness, and which, when cut partially through longitudinally at distances of an inch or so, and once quite through, can be opened out into firm elastic boards of serviceable width. Houses and even churches of a certain primitive beauty are built of such reeds, so bound together with cords that few nails enter into the construction, and which therefore yield so readily to the contortions of the earth during an earthquake as to be comparatively safe.

Garcia Morena was dictator, or nominally President, during my visit. He was a wealthy man, above need, which tempts to peculation ; who ruled the people with a rod of iron, but all for their good, though none the less to his own satisfaction—under whom the exports and imports notably increased, and at whose command a certain gloss of morality came to be spread over official life;

who introduced the Jesuits to reform the Church, and finally paid the penalty of his severity and patriotism by his life. Equador has a population of a million, more or less, principally Indians and Negroes, altogether unfit for constitutional government, as Garcia Morena well knew. The province of Guayaquil is as fertile as the Delta of the Nile, and the whole country wooded to the snow line of the Cordilleras. Its resources are infinite, but difficult of development, from climatic and ethnological causes ; nevertheless it produces large quantities annually of coffee, cocoa, chincona bark, sarsaparilla, india-rubber and ornamental woods.

During the afternoon we returned down the river and had time to study our deck load of fruits and natives. Indian physiognomy is essentially the same south and north of the Isthmus. In Equador a custom exists, a remnant perhaps of the Inca practice of mummying the dead, of compressing into a small compass and drying for preservation the head of the deceased. I saw one specimen, procured by an English lady, from the interior. It was the head of a full grown person, reduced in diameter from ear to ear to about three inches. The shape of the skull was well retained; but the proportion between its size and that of the ears and nose, which were somewhat too large, was not well maintained. A profusion of long black hair rose slightly in a dense mass from the shrunken scalp, and falling in a thick curtain, nearly two feet long, over the head and face, had to be thrown aside to display the withered features, tanned to a light brown color, not much deeper than the native hue. It was perfectly inodorous. As these relics of the dead are sacredly preserved, it is difficult to obtain them.

When darkness shut out the view we were steaming between banks covered with dense vegetation. When we awoke next morning we were sailing under a perfectly desert coast. We had entered the region of the S. E. trades, and with the first glimpse of the Andes we were witnessing the effect of their influence. This vast mountain range is the prominent feature of the South American continent. It gives expression to its scenery, and by its influence on the climate and country in great measure determines the character and social habits of the people. The main chain follows so closely the West Coast line, that at Guayaquil, 120 miles south of the equator, in fine weather, the towering peak of Chimborazo may be seen; from Arica, 960 miles further south, Mount Soroto on the

shores of Lake Titicaca is often discernable, and Aconcagua is a landmark to the mariner making Valparaiso, 900 miles still further to the south. The S. E. trades crossing the continent, charged with moisture from the Atlantic, meet the cold barrier of the Andes, and precipitate their watery burden on its eastern flank, yielding exuberant wealth of fertility to the *llanos* of Venezuela, to the *sylvas* of the Orinoco and Brazil, and to parts of the *pampas* of the Argentine Republic, though at the expense of the narrow strip of country between the Cordillera and the Pacific. Within the area of these invariable winds, that is, from a little south of the Guayaquil River to Central Chile, or for a distance of 1,800 miles, rain either never falls, or is a more startling phenomenon than an earthquake. The rivers therefore are small, not only because from their source in the Andes to where the last drop is absorbed by the thirsty sand, not an affluent joins them, but also because even the higher portions of the Western slope of the Andes are so scantily clad with snow, that the rivers have but a small store of nourishment to draw from. The southern limit of the trades is not so sharply marked by the ardity of the coast as is the northern, for in sailing from Caldera, in Chile, southward to Concepcion, along 550 miles of coast, one passes from a desert where rain does not fall for years together, thence along a coast where summer showers are unknown, though winter rain storms occasionally occur, to a climate as humid as that of Ireland itself. At this, the southern end of the desert strip, there is, therefore, no violent transition from sterility to fertility.

About noon of the day following our departure from Guayaquil, we passed Cape Blanco, which bounds the Gulf of Guayaquil to the south. The coast here is remarkably bold, steep cliffs from 500 to 800 feet high forming a barrier to the sea and presenting beautiful instances of distorted stratification. Where a gap in the wall occurs, the sand streams down from the desert behind like yellow glaciers. Over the cliffs we could see the tops of the first range of the Andes, to whose base the desert stretches, except along the few river valleys. Between Cape Blanco and Cape Parená, the most westerly point in South America, the cliffs lose their precipitous character, and become high sandy hills, strewn with torn masses of rock ; and before reaching Paita the coast line appears quite low, but out of the sandy sea arises here and there an isolated rock mass.

At dusk we cast anchor in the open roadstead of Paita, a town without a drop of drinking water within 20 miles, but the outlet of a rich back country, and once a place of great importance. For, as the trades are here entered, the fleet sailing South in days of yore, with its cargo of European goods, discharged them at this point, to be transported hence by land to their destinations. In the teeth of the trades, it was a quick passage when the 140 leagues to Callao were made in fifty days. Don Jorge Juan tells of a captain who married on the eve of his departure from Paita, but ere he reached Callao had become the father of a son old enough to read. It is now the terminus of a short line of railroad to Piura, 45 miles distant, the centre of the rich inland district which sent us for transport to Lima, 100 tons more fruit, besides cotton, and 110 head of cattle. These were unceremoniously hoisted on deck from the *balsas* alongside, by a rope slung over their horns. Rich as the back country is, the area of fertility is much smaller than when the Spaniards subjugated the Incas, for a most perfect system of irrigation then carried the water from the river beds at their discharge from the gorges of the Cordilleras over the plain, and maintained as a garden what has since relapsed into a desert. The old aqueducts remain, but the rivers have worn their beds to a depth below the canal levels. The canal from the Santa Clara river, for instance, is nearly three feet above the present water-course. Attempts are, however, being made to restore to cultivation part of the sandy waste, and thus increase the area of arable land, now too small to supply the wants of the population.

Paita boasts of a quay and an iron Custom-House ; besides these, a few irregular streets, lined with mud or cane houses, compose the town. A low range of sandy hills overlook it and the sandy cemetery. It was after dark when I landed. The population was lying on mats in the streets, a pleasanter sleeping-place than the hot houses. Those who had no mats were making themselves comfortable in the deep dust and sand. It looked like a city of the dead, for those who did not strew the streets were moving about at funeral pace, the women enveloped in black *mantos* which concealed face and figure. One's thoughts travelled back to 1741, when at dead of night the dreary town was startled into unwonted activity by the landing of forty men from the long boat of Anson's ship, the

Centurion. A panic spreading, and the whole population fled, half clad, to the hills, leaving their town a prey to the enemy.

A sail of about forty hours carried us to Callao. The coast lay generally too distant to be distinctly seen. It is low, and its hillocks of sand remind you of the dunes of Holland. We passed inside the Lobos, a northern group of guano islands, whose stores were being kept in reserve. On the evening before reaching Callao, we had our first view of the snowy peaks of the second or main chain of the Andes, rising above the high coast range. They looked like heaps of burning coals or burnished brass. The sun sank majestically below the horizon, the sea rapidly engulfing it, but the mountain tops received its rays for at least four minutes after we had lost sight of the upper limb of its orb. It was twenty-five minutes after sunset before Venus travelled forth, and ten minutes more before it was dark. Every day the trade winds blew a gentle breeze from the S. S. E., ruffling the water; but at night we sailed over a sea of glass.

We entered Callao harbor, between the main land and the north end of the Island of San Lorenzo, which closes in the bay from the sea sufficiently to entitle Callao to the name of a harbour. At the foot of the bay lies the town, of low squalid buildings, square roofed and without any feature of beauty; and above them can just be distinguished the circular wall of the castle Real Felipe, famous in the eyes of Englishmen for its resistance to Lord Cochrane. But other signs of Anglo-Saxon influence over the destinies of South America are seen in the British and American frigates, which side by side overlook the town; in the large fleet of their merchant ships, rocking at anchor in the bay; but still more conspicuously in the many boats of the Pacific Steam Navigation Company, and their large works, employing 2,000 hands. Landward, ever the low lying town, can be seen in the distance the top of the hill San Christobel and the towers of Lima, backed close at hand by spurs of the coast range, which here contracts the sea-shore plain to seven miles or so.

Once off the water, we plunged into dirty streets, reeking with the filth thrown out of dirtier houses, paved with round cobbles or deep with dust, and traversed by open sewers. In dingy shops, dingier than a ship chandler's in the East of London, we find the places of business of important firms, and if we need the accommo-

dations of a hotel we shall probably be stowed away in a dark closet. But houses of Guayaquil reeds plastered with mud are not without their advantages under certain circumstances. In the bombardment of the town by the Spanish fleet in 1868, these houses discomfited the enemy more effectually than did the forts, for it was a waste of ammunition and a trial of patience to fire at them. When a shot struck, the elastic walls parted, gave it passage and closed again as if welcoming it in.

A railroad, the first built in South America, connects Callao with Lima, only seven miles distant inland. Side by side with the railroad is the old cart road, still as largely used as ever, for so strong was the influence of the guild of carters, that a charter to build the road could be obtained only on condition that it carry nothing but passengers and a few privileged articles of freight. The rest of the traffic between the capital and its port is still, as of old, carried over the sandy road.

The drive reminded me faintly of that from Boulak to Cairo. There are the same rows of trees planted in ditches cased with stone to convey water to their roots ; the gardens and fields inclosed with walls of unburnt brick, artificially irrigated; the strings of donkeys plodding or trotting through a cloud of sand and the sandy desert stretching beyond the narrow limits of cultivation to the yellow hills. Even the pyramids have their representatives in a group of the old sepulchral mounds, the *guacos*, one or two of them built in steps and in cubic contents not much inferior to the pyramid of Cheops ; and the resemblance to Egypt is heightened by the smell, not the bad smell of decaying animal or vegetable matter, which whether in dry or moist climates is the same and too strong to be distinctive, but a smell indescribable, yet which, when once perceived, never can be forgotten, and which most vividly associates together in the mind of the traveller the habitable scenes of all hot arid regions.

Lima is not a city to be described in a paragraph. As it stands to-day, it is the meeting point of the old Spanish colonial system and of the new republican ideas and practices ; and the heterogeneous mixture of the old and the new in society and government, and the baneful influence of the past on the present, make Lima and its inhabitants a study of special interest. It was founded by Pizarro, and became, what he intended it should be, the centre of Spanish

rule in the new world. There the viceroys of Spain maintained viceregal state, and governed with the aid of a small body of pure Spanish office-holders, who, free from the control of Madrid, enriched themselves at the country's expense, and spread corruption through every province of government—corruption which unfortunately has been inherited by their successors under the Republic, and has added another to the many unhealthy influences which have tended to mar hitherto the experiment of free government in Spanish America.

In Lima, one likewise sees in the exuberantly florid architecture of the churches, built at enormous cost, in connection with monasteries almost as extensive and extravagant as those of Old Spain, and still more in the gloomy building of the Inquisition, a most demonstrative proof of the power and wealth of the Church in days gone by, and of how it used them ; and to-day one sees no less palpably, in the carelessness and irreverence with which the public services are performed in those same churches, and the undisguised immorality of the clergy, a significant instance of the decline in religious fervor to which luxury and irresponsible power lead.

The ecclesiastical architecture is hideous in the extreme, contrived by its display of color and bedizement of sculptured ornament to attract the Indian eye; but the domestic architecture, with its dash of the Moorish, conspicuous in the enclosed balconies of exquisitely carved wood-work protruding from the second stories, so as to shade the streets, is pleasing in the extreme. To build high houses would be to erect structures for the first earthquake to make sport of, and, therefore, in order to obtain space, safety and comfort, the houses of the wealthy surround court after court, filled with flowers and cooled with fountains, connected one with another by wide passages which give a vista from garden to garden. The street gate is generally open, for the Limenos are not exclusive, and therefore the passenger in the street enjoys as well as the inmate the refreshing view.

But the streets themselves, with their motley crowds of whites and blacks and reds, of Spaniards, Negroes and Indians, of every shade of intermixture, tell their tale of the past, and make one despair of the future. Certainly, Lima is a scene where the effects of race, climate, corrupt government, ecclesiastical despotism and

irreligion, in their bearing on the development of free institutions, may be better studied than perhaps anywhere upon the globe.

In 1870 and 1871, Peru was sharing in the world-wide prosperity and the intoxication it produced. She had wasted in a marvellously short space of time the millions her guano beds had produced, and she was straining her credit to run lines of railroads from half-a-dozen hamlets on the coasts to indefinite points in the interior, to bring to markets minerals not yet mined, and agricultural products from land still in a state of nature. At the time Henry Meigs had taken railroad contracts involving nearly \$100,000,000 (one hundred millions of dollars) from a state virtually bankrupt. The railroads had, however, put boundless patronage into the hands of government, which it used to reward friends and to pacify enemies. An exhibition building was in course of erection, to which the world was expected to flock. The banks had doubled their business in a twelve-month. The shops vied with those of Paris. Never had so long a period elapsed without a revolution. But before the exhibition opened, President Pardo was assassinated. The railroad building soon ceased on most of the lines. Paper money became almost valueless, and coin so scarce that it was made a crime to export it. Although the system of reckless railroad building was dishonest and unwarrantable, there is no doubt that the real wealth of Peru lies beyond the Andes on the head waters of the Amazon, and that till the products of the interior can reach the world either by rail to the Pacific, or by water to the Atlantic, the guano, and nitre and silver she at present exports will not enable her to pay her debts and raise her to the position of a solvent power.

The most stupendous of her inland railroads is that which runs from Lima up the mountain gorge that discharges the River Rimac through the heart of the city. It is to reach the Cerro de Pasco silver mines and thence descend to the fertile lands to the east of the Andes—but our journey leads southward.

After two days' thorough enjoyment of Lima, which even the wretched hotel accommodation of this, the former metropolis of Spanish America, could not damp, I took another boat of the Pacific Steam Navigation line, and steamed out of Callao Harbor between the southern end of San Lorenzo and the mainland. We soon ran into a thick fog, and all night long our whistle piped as lustily as though we had been upon the banks of Newfoundland.

It never actually rains on the Peruvian coast, but the fogs of the summer nights, which, as the season advances, merge into the thick mists of the winter mornings, supply sufficient moisture to nourish a growth of cacti and aloes upon the seaward face of the coast hills.

At breakfast on the following morning we stopped at one of those oases of the coast, Tombo de Mora, where a river, or rather rivulet, running down from the Andes, produces a strip of arable land, prolific in its productiveness. Boats came off with fruit, now with few bananas, but with splendid grapes and peaches, passion-flower and cactus fruit. The new fruits and the cool breezes told us of our rapid departure from the tropics.

After two hours' detention at Tombo, we heaved anchor and steamed along the barren coast to Pisco, the vineyard of Peru. Like Tombo, there is along the shore a patch of verdure which one can trace inland till lost among the hills. Here we were detained for nearly four hours, taking on board the brandy of the country—the common sort called after the place, Pisco; the best quality, Italia. M. Elias, the nabob of the place, makes, besides brandy, a sherry, which, after a sea voyage, is as good as the best from Spain, and sells here at \$5 a gallon.

All the ports along this coast are open roadsteads. There is generally a mole; but, as at all times a most disagreeable ground swell rolls in, no vessel can lie at it; and swinging and rocking at anchor is most discomfiting to one's feelings.

On leaving Pisco we rounded Cape Pisano and saw distinctly the three crosses which have been excavated on the extreme end of the promontory. The work is supposed to have been done by Pizarro, and is annually cleared out by the inhabitants near by, who make the holy pilgrimage an excuse for a grand frolic and pisco-drinking.

The bare and barren Chincha Islands lie a few miles to the northwest of the Cape, and almost to the West another large guano island, at which fifteen large ships lay, loading. All the guano but the scrapings was even then removed from the Chinchas. What was to last one thousand years had not lasted twenty, and the millions the guano brought (for it lay in places 150 feet deep, and netted to the Government \$30 a ton) had been all wasted—spent on revolutions, in filling the pockets of those in office, and bribing those who were out.

The guano from the Lobos Islands, between which and the mainland we sailed after leaving Paita, as well as from other islands and from some of the headlands, is far inferior, and brings 33 per cent., so that the best is gone; but what remained was still so valuable that the Government was borrowing against it to build railways and make other public improvements. The fate of the Peruvian bondholders has since given sorry proof of the bad faith of the borrowers and the scanty value of the security.

The present scarcity of birds all along the coast is the more remarkable when we try to imagine the flocks which must have teemed upon every island and headland at the time these valuable stores of manure were being deposited. Our captain had never seen bird-life more abundant than at present; but an old coaster once told him the birds had forsaken the coast within the century, for that in his younger days they at times covered the water of some inlets so thickly that it was difficult to force a *balsa* through them.

The next day we spent one and a half hours rocking in front of twenty huts on a barren promontory, with not a blade of grass in sight, called Chala. There must be verdure behind the hills, for more peaches, oranges and lemons came on board, in return for which we sold the Chalans flour and rice and Florida water. Our deck was lined as soon as we left Callao with open tents, occupied by traders, who, on our arrival at each port, got their goods out and carried on a languid traffic with those who came on board. The only good shop-keeper among them was a Chinaman, who had a general stock of hardware and drygoods, gold watches, fruit, pisco, and I know not what beside.

At sunset we were passing under precipitous cliffs, and early on the following morning we anchored at Islay and Mollenda, two so-called ports on opposite sides of a rocky promontory—Islay the terminus of the donkey road to Arequipa, and Mollenda of the Arequipa railroad; but as Mollenda is even a more dangerous roadstead than Islay, the railroad will probably have to be cut through the rocky barrier. Of course, neither place is in itself anything, a few board and shingle houses, for here there are neither reeds, nor canes, nor mud to make adobe huts. Water has to be brought for miles over a desert, streaked most curiously with a pure white sand.

The railroad to Arequipa is a magnificent piece of engineering. We could see the road winding zig-zag up the steep sides of the coast hills to the pampas. Over these it pursues a level course for forty-five miles, and then ascends a mountain more than three thousand feet high to Arequipa, seven thousand feet above the sea. Since then it has been extended to Puna, on the shores of Lake Titicaca in Bolivia, and is diverting a great deal of the Bolivian trade from the Tacna and Arica Railroad.

From Ilo, the port we next anchored at, the first shovelful of sand, not soil, of a new line into the interior, was to be turned on the morrow—another visionary line intended to open up the wondrous but mythical mining wealth of the interior.

We got away from Ilo at 4:15 in the morning and continued our course under high bluffs, with the coast range not far off and the white peaks of the Cordillera gleaming in the sunshine above the clouds. At midday we anchored off Arica, but what a different-looking place to that described by travellers! There were the bold, perpendicular cliffs shutting in the valley to the south, and the coral reefs and islands forming the breakwater and an excellent harbor, and the valley tapering funnel-shaped to the east till closed in the distance by the hills trending north and south. The main features of the landscape were unchanged, but all else was gone. The splendid custom-house and public buildings, with their iron columns, which lined the sea; the mole; the railway station and construction shops; the thickly-packed houses; the churches and the gardens which filled the valley—all were first overturned by an earthquake on August 13th, 1868, and then swept away by a wave, which has left parts of the plain, once covered by iron and stone buildings, as level as a ploughed field. The devastation was awful, and the people had been so paralyzed that little had been done at the time of my visit to repair the damage.

It was the finest port along the coast, and as most of the products of Bolivia found their way through it by the Tacna Railway, it was provided with commodious public buildings, machine shops, excellent hotels, and inhabited by some 10,000 people.

About five o'clock in the afternoon of August 13th, 1868, an earthquake occurred, which, after two or three gentle vibrations, terminated in a shock which laid the town in ruins. As, however, there were very few two-storied buildings, and nearly all were adobe

and roofed with mud, not many lives were lost. Those buried were being exhumed when the sea was seen to recede and leave nearly a mile of bare coast. Soon a huge wave slowly gurgled up ; the water was in a boil, and gradually rose till it reached its highest normal limit. The wave then invaded the land and flowed on into the interior, gathering force as it went and carrying desolation in its track. The water stood at the shore line thirty-six feet perpendicularly above its highest tidemark, when the wave retreated with terrific force. Twice it returned before the sea recovered its equilibrium. Five ships lay at anchor in the bay ; one, when the water receded, struck on a ledge of rock and broke amidships. The cables of a United States storeship did not part, and when the sea flowed in she foundered with all on board. A French bark was carried high and dry into a garden, where her skeleton still lies. The Peruvian man-of-war *America* and an American gun-boat, the *Wateree*, both parted their anchors and were hurried towards land. The United States steamer fortunately went head on and was landed about half a mile from the shore, at the foot of a bluff, as safely as if placed in a dry dock, and with the loss of only one life ; but the *America* struck beam on, her mainmast went, her guns parted from their fastenings, and eighty of the men who sought safety in the rigging were lost. She seems to have been carried back about 200 yards by the receding wave. I wandered through her wreck and tried to conceive the scene of horror. She lies two miles, at least, from where she was anchored, and about the same distance north of the town, on a spot where formerly there was a delicious garden. The American ship lies close under a bluff about fifty feet high; but the wave must have overtopped even it and reached far up on the plain above, for I found it strewn with sailor coats, soldier's belts and cartridge boxes, skeletons of fish, packets of ammunition and broken packing cases. The only leaf of printed matter I picked up was from one of Scott's "Chronicles of the Canongate."

That part of the town nearest the cliffs, which jut out on the south, being more elevated, did not feel the force of the waves as much as the more northerly quarters, where absolutely nothing was left. The railroad officials could hardly have told where the railroad building stood, had not a solitary palm tree remained standing. The three engines in the engine-house were hurled to

the distance of a quarter of a mile, and now show their steam-drums above water when the surf recedes. The coast is strewn with broken cars and twisted rails; heavy sleepers were carried out to sea and driven ashore again miles distant, and an old horse—a good-for-nothing one, of course—was washed away and landed safely on the other side of the cliff.

Where the splendid public buildings once stood, there are strewn a few broken columns, covered with dry sea-weed. I walked for a mile over the site of the old city, and it was as level as the desert beyond. Two or three houses withstood the force of the wave; one was protected by the goods from the custom-house packing against it as the wave mounted, and forming so strong a barrier that they saved it from destruction as the wave receded. Mr. Worm, the traffic agent of the railroad, told me he had his leg broken by the falling of his house, and a man, who had gone through the earthquake at Mendoza, had exhumed him and was carrying him off, when they observed the strange agitation of the sea. His bearer dropped him and ran; but two of his own men came to his assistance and carried him to the cliff, whither all had time to flee, so slowly did the water rise. There would have been fewer lives lost had the people not taken to the boats for safety on the occurrence of the earthquake, and been still on the water when it receded half an hour afterwards. All night long slight shocks occurred to terrify the maimed and frightened crowds gathered on the cliff. For three days Mr. Worm lay there without a blanket to cover him or any one to set his broken limb, till the medical officer of the United States gun-boat came to his relief. But the troubles of the doomed town were not yet over. In December, when rich and poor were still sheltering themselves in tents and huts, yellow fever broke out, and all agree that the earthquake was a lighter evil than the plague. Those who could afford it paid \$10 a day for a native servant; those who could not helped themselves as best they could. I remarked to the head engineer, who was locking up a cupboard in the open air machine shop, that he had airy quarters. “Oh, yes; we have not yet recovered from the earthquake and the yellow fever; for a year no one had the heart to do anything.” And he hoped it would not occur again—such catastrophes happened only twice in a century, at most—and he went off happily to his tea.

The officer commanding the *America* reported to his Government

as follows: "At 5.15 was felt a violent earthquake, and all the houses in the town were seen to fall. A boat was immediately lowered and manned by four men, who were to take on shore the appliances necessary to assist in extinguishing the fires which were seen to be spreading. The captain's boat was also ordered out; but before the men had embarked came a current from the south, so strong that both boats were swamped by it. The starboard anchor was dropped and sixty fathoms of cable run out, and one hundred fathoms on the larboard side, and by these anchors we were held. The first current lasted five minutes, flowed at the rate of $5\frac{1}{2}$ miles and inundated the town. Then followed a second current, flowing in an opposite direction, that is, from the north, which left the bay almost dry, stranding at their anchorage two ships and all the small craft.

"The currents from south to north succeeded each other with such frequency and the alternations were so rapid that it was impossible to lower boats and assist the people crying for help, and whom we saw swept over the breakwater.

"At 6.45 the currents increased to $9\frac{1}{2}$ knots, and their duration was from five to ten minutes. At 7.05 came a current from the south, with a velocity of $10\frac{1}{2}$ miles, which obliged us to ship our anchor chains. Instantly we were ashore. Four minutes after, we were carried back to leeward, and one of the many waves which washed over us swept from the bridge our commander and Ensign Herrera.

"The ship was now stranded and its poop full of water, when the sea suddenly seized her and carried her nearly two miles, leaving her high and dry. Immediately we all lowered ourselves on to the beach and made all haste to escape, as other waves were rolling in behind us.

"The *Edward* is stranded in the gardens at about a mile from the town. The wreck of the *Chanarcillo*, and the hulls of the *America* and *Wateree* lie at about one and a half miles from the town, to the north.

"The *Morro* was violently shaken. Until the afternoon of August 16th shocks were felt and rumblings were heard, some say continuously. The violent shocks followed each other at intervals of 15 to 20 minutes at one time, and of 50 to 60 minutes at another."

The above narrative makes the first movement of the water to be

landwards, and this agrees with the order of the oscillations as observed elsewhere and on former occasions. But the first landward wave must have been so insignificant as not to have attracted the attention of the panic-stricken people, for all who described to me the scene spoke of the recession of the waves as what they first observed, and all agreed that the time occupied by the sea in retiring and then majestically rolling in gave ample opportunity to escape.

The earthquake that thus laid Arica in ruins is memorable for the wide extent of the earth's surface which experienced the commotion even more than for the violence of the shocks at the focus of intensity. This focus was not far from the latitude of Arica, but more likely beneath the Pacific than on the continent. Both north and south of Arica and Arequipa the catastrophe, the further it was felt, became less and less appalling in its consequences; while the time at which the first shock was then experienced was earlier than that at which the earliest vibrations were felt in latitudes either higher or lower. This frightful wave of the earth's seemingly solid but really elastic crust, originated at Arica at 4h. 38m., Lima time. Arequipa lies 140 miles to the north and 90 miles to the east. But four minutes later its inhabitants received the first warning of the impending disaster, which there was almost as terrible as in Arica; and but four minutes more elapsed before Lima and Callao, 300 miles further north, were slightly shaken by the now nearly spent wave. And it propagated itself with almost equal velocity southward, reaching Copiopo, in Chili, 610 miles south of Arica, at 4.52, or 14 minutes after it started from Arica. It was not felt as a shock of unusual violence north of Callao or south of Copiopo; but the marine phenomena were strongly marked over a much wider area than the terrestrial. At Callao violent currents threw the bay into such commotion at the moment the shock was felt on land that some ships dragged their anchors and came into collision, and the sensation experienced by those on board was as if the ship's keel had been struck by a large whale. At every port between Callao and Arica the sea rose and receded beyond its usual bounds, and south of Arica great damage was done; even as far south as Concepcion, in lat. $36^{\circ} 43'$, at nine in the evening, without any trembling of the earth, on a perfectly calm night and at low tide, the sea rolled up the river, tore ships from their anchorage

and stranded them on the bar. Still further south, on the Island of Chiloe, 1560 miles south of Arica, the sea was agitated about the same hour in the evening without apparent cause. Strange to say, the level of the sea for some distance north and south of Valparaiso, which lies midway between Coquimbo and Concepcion, at both which ports, though no shock was felt, the waves rose high, was not perceived to be at all disturbed.*

Calculating from the above data, the earth wave traveled northward at the rate of 55 miles per minute ; southward, at the rate of 44 miles per minute.

The sea wave seems to have struck the Sandwich Islands about twelve hours after it originated at Arica, and therefore, when traversing the broad sweep of the Pacific, the wave traveled at the rate of 525 miles an hour, or nearly one-half the speed of the earth's surface at the equator. But its rate of speed along the coast was much slower, for the marine commotion was not perceived at Ancud, on the Island of Chiloe, till about ten o'clock, or five hours after the earthquake at Arica. As Ancud is 1400 miles south of Arica, the wave can have traveled at the rate of only 280 miles an hour.

The anticipation of a half century's rest, with which the Aricans calmed their fears, was doomed to speedy dissipation, for at about 3.30 on the morning of May 9th, 1877, occurred another earthquake, followed by a wave of hardly lesser height than that of August, 1868. This levelled and swept away again the partially reconstructed town, and the wave even washed the *Wateree* from her high-and-dry position. All along the coast, north and south of Arica, more or less damage was done—at one place by the earthquake, at another by the wave—and the oceanic phenomena was as widely felt as on the previous occasion. It may be remembered that we were warned of the event by a messenger more rapid than steam, for on the 10th the telegraph announced the arrival from the south on the California coast of a great wave. This wave seemingly took one and a half hours longer to travel across the Pacific than did the preceding, as it was at 5 A. M. of the 10th—corresponding to about 10 A. M. of Peruvian time—that it was observed at Honolulu.

By a very careful and extended collection and mapping of observations as to the direction, deflection and rate of speed of these

* Domeyho, in *Anales de la Universedad de Chile*.—Jan., 1869.

huge waves, much information might be acquired, not only as to the probable conformation of the bottom of the Pacific basin, but as to the focus of those terrific commotions which so frequently shake the whole South American continent.

During my residence in South America I did not witness even one of those awful convulsions of the earth's surface, which, by the forces they exhibit in activity, revive before our eyes the scenery of past geological ages. But a week seldom passed, in a little valley where I spent some months, without our experiencing either a distinct shock, or, what is more startling still, a prolonged subterranean roar unaccompanied by any sensible motion. This peculiar sound was so loud betimes that I have even mistaken it for the blowing off of a large steam boiler not fifty yards from the house. Shocks were felt in our *quebrada* which did not affect the country round, and the direction whence the noises and undulations came was always the head of the valley. While the more violent earthquakes, therefore, are felt over extensive areas, many are confined to a very limited tract. Another proof of the superficiality of many, if not all, earthquakes, is that even in Chili they are rarely felt in mines. I met only one miner who remembered to have felt a shock underground, and the instances of damage done to mines are very few. Chilian mines are now generally worked on the European system, and a vast weight of stone and poor ore is therefore stowed away in the excavations on floors of timber, which would sink with their load did the walls of the vein, which give them support, heave as violently as the crust of the earth. Local circumstances, however, have a notable influence. For instance, in Canada, in October, 1870, an earthquake of sufficient violence to split thick stone walls occurred. At the Harvey Hill Copper Mine, in the Province of Quebec, where the strike of the Lower Silurian slates nearly corresponded with the direction of the waves, and where the workings were principally across the direction whence the undulation came, the shock was felt so severely at 40 fathoms deep that the miners rushed to the surface in terror; whereas, at the Capelton mine, 60 miles off, on a bed of iron pyrites, the miners were made aware of the earthquake only on returning to surface at the end of their shift.

For three days after leaving Arica we steamed beneath bold cliffs, towering from 1500 feet to twice that height above us, and sinking

generally precipitously into the sea, which only here and there has yielded up narrow strips of sandy beach to man. These have been taken possession of to build thereon the desolate towns which look like the very outposts of the habitable earth. First we passed Pisagua, not nestling, but crouching beneath a precipice; and Mejillones, in Peru, another group of wooden huts, occupying a like position; and Iquiqui, with room to expand inland beyond its present site for about a mile—all three outlets for the nitre which is obtained on the pampa behind the overhanging hills. A trade so vast has sprung up in that mineral that Iquiqui alone shipped in 1873, 6,263,767 cwt. But through the unwise interference of the government, which has made the mining of nitre a government monopoly, the total production of Peru fell in 1877 to 4,706,681 cwt. As the nitre beds extend across the narrow Bolivian coast into Chilian territory, and Chili declines to adopt Peru's commercial policy, war has been the result.

Steaming on beneath this rocky barrier, seldom broken now by even the ravines of dry river-beds, we crossed the boundary line of Bolivia and Peru, but all along the Bolivian coast the same desolation reigns. Nevertheless, men have there built themselves towns and are tempted to live in them, for copper and guano, as well as nitre, exist to excite their cupidity. Bolivia, with its glorious, prolific interior, enjoying a temperate climate, but so uniform that it raises the most delicate of tropical productions, is represented on the sea by the group of stone and wooden huts and houses comprising the town of Cobija, most forlorn in its pretensions as the seaport of what claims to be a great power. It had been, shortly before this time, the scene of a revolutionary battle, fought on the most harmless principles of revolutionary tactics. In the confusion no one had been officially appointed to the post of Captain of the Port, so its duties were assumed by a gaunt, sinister-visaged colonel, one of the successful heroes, who boarded us, but behaved with due civility and let us depart again in peace.

The nitre of this dreary coast is now the cause of contention between Chili and Bolivia, and Cobija and adjacent ports have been occupied by Chilian troops.

On we steamed past the confines of Bolivia and the neutral ground between Bolivia and Chili, which lies from 23° to 25° South. The establishment of this zone, the revenue from the

minerals of which was to be divided between the contracting powers, was agreed to by the treaty of 1866, when a war was brewing on account of the disputed boundary—a war which unfortunately the moderate counsels then dominant availed only to postpone.

But Chili gives the visitor from the North as gloomy a reception as Bolivia, for the Atacama desert faces him, and bids him abide on the sea, unless he would scale its high, rocky breastworks only to meet desolation and death, if he persist in penetrating its recesses. But ten years ago some of the secrets of that desert waste were unearthed, and forty leagues inland, over a trackless waste of sand and rock, were discovered silver lodes of fabulous richness. A waste the desert will remain; but Antofogasta, in Bolivia, has become the Pacific terminus of a railroad line, and the other terminus is to be 10,000 feet above the sea, on the cold, arid plateau to which the great chain of the Andes has here sunk, at the populous silver *mineral* of Caracoles.

For 300 miles more we skirted the almost unbroken barrier of rock; but, though the scene was barren as before, we saw more frequent traces of human industry. At El Cobre, Paposa, Taltal, and other ports, we passed copper smelting establishments or copper mines. At Pan de Azucar we saw the furnaces where copper ores from mines forty leagues in the interior are brought by ox-carts to be smelted. The name Pan de Azucar is common on the coast as applicable to the sugar-loaf hills which, whether as high cones or small peaked rocks, reminding me of huge stalagmites, form a striking element in the landscape.

At Chañaral we lay for some hours, discharging cargo for the inhabitants of that unsubstantial town of wooden shells, dirty from the smoke of the smelting furnaces and the large water distillery, and for the population at the mines of La Salada and Las Animas. These lie ten leagues up the gorge which here cuts through the rocky plateau, and which contains the bed of the Rio Salada, a river-bed not wetted often in a century.

At length we reach Caldera, the first place we had seen possessing any title to be called a town since leaving Callao. A street of well-built, two-story, stone houses, supported by a stone church, stone custom-house and railroad station, lines the shore; and a pier runs out into deep water and allows one the luxury, in fine weather, of walking ashore as soon as liberated by the

Captain of the Port. It is the port of Copiopo, and the railroad outlet of the silver regions of Chañarcillo, Las Puntas and Lomas Bayas.

A few hours brought us to the last of the altogether desolate ports of Chile, Carrizal Bajo, the seaport of the Carrizal and Cerro Blanco mines; and a few more to Huasco, at the mouth of the river of that name. We saw no water flowing, for every drop had been withdrawn for artificial irrigation; but looking up between its naturally-terraced banks, we distinguished, not far inland, green fields and orchards—a grateful sight—and we had rich earnest of what the orchards can produce, in baskets full of luscious grapes and peaches, the first verdure and the first fresh fruit we had seen since leaving Arica. The next stopping place was Coquimbo. At anchor here we were really at rest, for it has a harbor which shuts out the swell, and is not, like all the other falsely called ports, an open roadstead. A sail of twelve hours, in sight of a rocky shore, surmounted by undulating hills, and with here and there a glimpse of a peak of the far-off Andes, brought us into the noble Bay of Valparaiso.

I fain would describe to you, but time does not permit, the romantic scenery of Chile and the hospitable habits of its people; the curious blending of autocratic and republican principles and practices in its constitution and government; the rapid but substantial growth of its mineral and agricultural resources, and the healthy state of its literature—a better proof of which could not be given than that a daily newspaper published in 1870 a translation of the annual address of your illustrious President.

APPENDIX.

Extracts from the Report of Mr. ST. JOHN, H. M. Secretary of Legation at Lima.

THE CERRO DE PASCO SILVER MINES PRODUCED IN—

1874.....	1,395,936	ounces.
1875.....	1,351,432	"
1876.....	1,358,792	"
1877.....	1,427,592	"

Estimated annual imports into Bolivia through the Peruvian port of Arica from—

Great Britain.....	£450,000	\$2,250,000
France	260,000	1,300,000
Germany.....	230,000	1,150,000
Chili	34,000	170,000
United States	10,000	50,000
Italy	8,000	40,000
Spain and Portugal.....	8,000	40,000
	<hr/>	<hr/>
	£1,000,000	\$5,000,000

II.

PERUVIAN GUANO.

In the Islands of Lobos a certain amount of guano remains, estimated lately at 600,000 tons, but the quality appears to be inferior and all shipments have for the present ceased.

The whole amount of guano in the southern deposits which remains to be exported amounts to an estimated quantity of 1,800,000 tons, thus distributed:

Huanillas	1,000,000	tons.
Point Lobos	200,000	"
Pabellon de Pica.....	350,000	"
Chipaua Bay.....	250,000	"
	<hr/>	
	1,800,000	tons.

The earthquake and waves on the 9th May, 1877, completely destroyed the Government Guano Works at Chanavaya, and caused the death of 400 people. Half a million dollars of property was destroyed on land, and \$1,100,000 of shipping.

At Point Lobos the loss was estimated at \$100,000 on land, and \$400,000 on the sea.

At Huanillas a few lives were lost, \$200,000 of property was destroyed on land, and \$500,000 worth of shipping.

In 1877 there was sold of guano to—

England and her colonies.....	100,954 tons.
France and her colonies.....	72,067 "
Belgium	71,473 "
Spain.....	32,995 "
Germany	23,455 "
Italy.....	5,440 "
Holland.....	3,658 "
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	310,042 tons.

III.

PERUVIAN NITRE (NITRATE OF SODA)

Is mined from superficial horizontal beds of great extent in the province of Tarapaca, and is exported from a number of ports between Arica and Iquique. Nitre has also for many years been extracted by Chilians from the neighborhood of Antofogasta in Bolivia; and lately Pissis has found it in quantity as far south as Taltal in Chili.

In 1875 the exports from Peru reached 326,869 tons. In that year Congress authorized the purchase of the nitre beds by Government, and the issue of a loan of \$35,000,000, of which \$20,000,000 was to pay for them. By raising the export duty from \$1 to \$2.50 per cwt. the unwilling proprietors were coerced into selling. The result has been that by reducing the exports to 213,940 tons in 1877, the Government forced up the price from \$55 to \$80. The export of nitre by the Chilian company from Antofogasta has of late years increased rapidly, till it has reached 750,000 tons, and threatens to interfere seriously with the Peruvian monopoly; hence the present war.

IV.

PERUVIAN RAILROADS.

The following table shows the number and length of the Government and

private railroad lines in Peru, and the contemplated cost of those which had been erected or were in course of erection in 1876, since which date little construction has been done:

GOVERNMENT LINES.	MILES LENGTH.	CONTRACT PRICE.
Mollenda to Arequipa.....	114 }	
Arequipa to Puno	232 }	Finished. \$23,027,580
Juliaca to Cuzco	230	66 miles finished. 22,916,665
Chimbote to Huaraz and Remay..	172	52 " 22,000,000
Pacasmaya.....	93	A portion finished. 5,562,500
Ilo to Moquegua	63	Finished. 4,626,250
Callao and Lima to Oropa.....	145	86½ miles opened. 19,861,285
Salaverry to Trujillo	85	Dist. opened uncertain. 3,116,635
Paita to Piura.....	63	" " 1,757,915
Ica to Pisco.....	48	Finished.
Lima to Ancon and Chancay.....	43	"
		\$102,367,860
PRIVATE COMPANIES.		
Arica to Tacna.....	39	Finished.
Lima Railways	17½	"
Eten	50	At work.
Pimentel.....	45	"
Tarapaca	75	Finished.
Malabriga to Ascape.....	25	No information.
Pasco Mines.....	15	At work.
Lima to Magdalena.....	5	Finished.